

Application No.: 10/685179

Docket No.: 08577-00045-US

AMENDMENTS TO THE CLAIMS

1-17. (cancelled).

18. (currently amended) A fuel cell which comprises a membrane comprising from 30 to 99.5% by weight of a sulfonated aromatic polyether ketone which has an ion-exchange capacity of from 1.3 to 4.0 meq ($-\text{SO}_3\text{H}$)/g of polymer, and from 0.5 to 70% by weight of a polybenzimidazole, obtainable by a process comprising the following steps:

- a) preparing a solution comprising from 30 to 99.5% by weight of a sulfonated polyether ketone and from 0.5 to 70% by weight of a polybenzimidazole by dissolving the salt of the sulfonated polyether ketone and the polybenzimidazole in a ~~suitable organic~~ an organic solvent,
- b) ~~using~~ shaping the solution obtained in step a) to produce a membrane fuel cell having a thickness of at least 5 μm ,
- c) washing the ~~fuel-cell~~ membrane obtained in step b) with water or with a dilute acid of from 0.1 to 20% strength.

19. (previously presented) The fuel cell as claimed in claim 18, wherein said membrane has a thickness of at least 30 μm .

20. (previously presented) The fuel cell as claimed in claim 18, wherein said membrane has an ion-conductivity, measured in contact with liquid water at room temperature with the aid of 4-pole impedance spectroscopy at a phase angle $|\theta| < 1^\circ$, of not less than 50 mS/cm.

21. (previously presented) he fuel cell as claimed in claim 18, wherein said membrane has a modulus of elasticity (determined as gradient of the tangent at 1.2 MPa) in the dry state of at least 600 MPa at 23°C and 50% relative humidity.

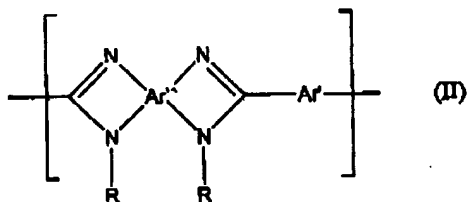
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22. (previously presented) The fuel cell as claimed in claim 18, wherein said membrane has a modulus of elasticity (determined as gradient of the tangent at 1.2 MPa) in water at 60°C of at least 90 MPa, and an ultimate elongation of more than 200%.
23. (previously presented) The fuel cell as claimed in claim 18, wherein said membrane has a residual solvent content of less than 0.5% by weight.
24. (previously presented) The fuel cell as claimed in claim 18, wherein use is made of a sulfonated polyether ketone containing repeat units of formula I
- $$-\text{[Ar}^1\text{-O-Ar}^2\text{-CO]}-\text{ (I),}$$
- where Ar¹ and Ar², independently of one another, are bivalent, aromatic or heteroaromatic radicals, unsubstituted or substituted with one or more monovalent organic groups inert under usage conditions, and wherein at least a portion of the radicals Ar¹ and Ar² have substitution by radicals of the formula $-(\text{SO}_3)_w\text{M}$, where M is a metal cation of valency w, or an ammonium cation, and w is the integer 1 or 2.
25. (previously presented). The fuel cell as claimed in claim 24, wherein Ar¹ and Ar² are naphthylene or phenylene.
26. (previously presented) The fuel cell as claimed in claim 24, wherein Ar¹ and Ar² have substitution by from one to four amino, alcohol, ether, alkyl, aryl, sulfonyl, phosphoryl, carbonyl, nitro or carboxylic acid groups, or the nitrogen atoms of the polybenzimidazole have substitution by these groups.
27. (previously presented) The fuel cell as claimed in claim 18, wherein the polybenzimidazole has repeat structural units of the formula II

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where Ar'' is a tetravalent aromatic radical, Ar' is a bivalent aromatic radical and R is hydrogen or an inert monovalent organic radical.

28. (previously presented) The fuel cell as claimed in claim 27, wherein Ar'' is 1,2,4,5-phenylene or 3,4,3',4'-biphenylene, Ar' is 1,3- or 1,4-phenylene and R is hydrogen.
29. (previously presented) The fuel cell as claimed in claim 18, wherein the sulfonated aromatic polyether ketone used is a polymer of PEK type which has an ion-exchange capacity of from 1.3 to 4.0 meq (-SO₃H)/g of polymer.
30. (Previously presented) The fuel cell as claimed in claim 18, wherein the sulfonated polyether ketone is used in the form of its lithium, sodium, potassium or ammonium salt.
31. (previously presented) The fuel cell as claimed in claim 18, wherein the proportion of the polybenzimidazole is selected depending on the degree of sulfonation of the sulfonated polyether ketone according to formula III below:

percent by weight

of polybenzimidazole = $9.4 \times -12.4 \pm (9.4 \times -12.4) \times 0.5$ (III),

where x is the ion-exchange capacity of the sulfonate polyether ketone in meq (-SO₃H)/g of polymer.

32. (Previously presented) The fuel cell as claimed in claim 18, wherein the solution obtained in step a) has a viscosity of from 500 to 5000 mPas (measured at 80°C in a solution of the polymer in NMP (N-methylpyrrolidone) using a Couette rotary viscometer).

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33. (previously presented) The fuel cell as claimed in claim 18, wherein said dilute acid is nitric acid, sulfuric acid or phosphoric acid.
34. (Previously presented) The fuel cell as claimed in claim 18, wherein the fuel cell is a direct methanol fuel cell.